

Superconducting Electric Boost Pump for Nuclear Thermal Propulsion, Phase I

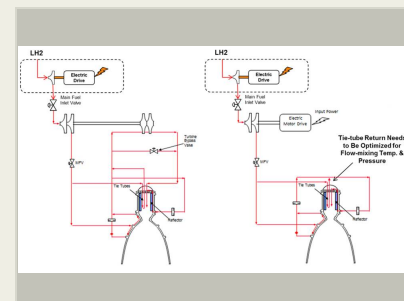
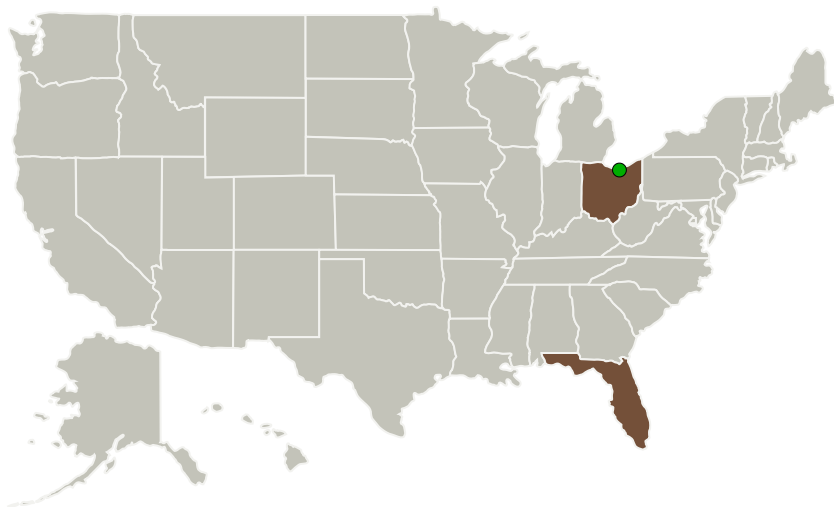
Completed Technology Project (2014 - 2014)



Project Introduction

A submersible, superconducting electric boost pump sized to meet the needs of future Nuclear Thermal Propulsion systems in the 25,000 lbf thrust range is proposed. The proposed solution combines active electronic speed control technology with state-of-the-art cavitation suppression techniques to meet the near-zero Net Positive Suction Head requirements with up to 50% vapor content and enables a higher level of safety, reliability and operability for the Nuclear Thermal Propulsion (NTP) system than turbine driven pumps. The proposed pump configuration enables placement in, or close-coupled to the tank where it can be shielded from the reactor to prevent neutron flux heating. Evaluation of NTP power cycles will enable feasibility determination for driving the boost pump, and possibly the main pump, electrically and provides a comparison of approaches for the derivation of requirements needed in the development of an ultra-long life, highly reliable integrated pump system for NTP. The requirements, system trades and benefits analysis, conceptual design, risk reduction and Phase II planning will be documented to enable further development and TRL transition from TRL 3 at the completion of Phase I to TRL 5 at the completion of Phase II.

Primary U.S. Work Locations and Key Partners



Superconducting Electric Boost Pump for Nuclear Thermal Propulsion Project Image

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Organizations Performing Work	Role	Type	Location
Florida Turbine Technologies, Inc.	Lead Organization	Industry	Jupiter, Florida
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Florida	Ohio
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Project Transitions

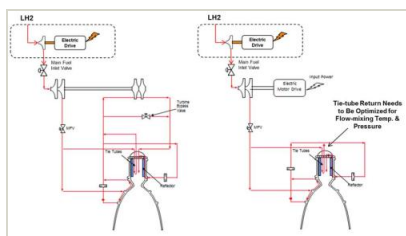
▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139537>)

Images



Project Image

Superconducting Electric Boost Pump for Nuclear Thermal Propulsion Project Image
(<https://techport.nasa.gov/image/127820>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Florida Turbine Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Timothy Miller

Co-Investigator:

Timothy J Miller

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Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.4 Advanced Propulsion
 - └ TX01.4.3 Nuclear Thermal Propulsion

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System